

REPORT DOCUMENTATION PAGE

AD-A217 746

1a. REPORT SECURITY CLASSIFICATION ELECTE			1b. RESTRICTED	
2a. SECURITY CLASSIFICATION AUTHORITY JAN 16 1990			3. DISTRIBUTION STATEMENT DTIC	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE DS			Approved for public release Distribution Unlimited	
4. PERFORMING ORGANIZATION REPORT NUMBER 6-28442			5. MONITORING ORGANIZATION REPORT NUMBER(S) N00014-89-J-1857	
6a. NAME OF PERFORMING ORGANIZATION Rensselaer Polytechnic Institute		6b. OFFICE SYMBOL (If applicable)		7a. NAME OF MONITORING ORGANIZATION Office of Naval Research
6c. ADDRESS (City, State, and ZIP Code) Office of Minority Student Affairs Troy, New York 12180-3590		7b. ADDRESS (City, State, and ZIP Code) 33 Third Avenue, Lower Level New York, New York 10003-9998		
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Office of Naval Research		8b. OFFICE SYMBOL (If applicable)		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER N00014-89-J-1857
8c. ADDRESS (City, State, and ZIP Code) 33 Third Avenue, Lower Level New York, New York 10003-9998		10. SOURCE OF FUNDING NUMBERS		
		PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.
				WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) ONR Summer Scholars for the 1989 PREFACE Program				
12. PERSONAL AUTHOR(S) Smith, Mark D.				
13a. TYPE OF REPORT Final Technical		13b. TIME COVERED FROM 4/89 TO 12/89		14. DATE OF REPORT (Year, Month, Day) 1989/December 31
15. PAGE COUNT				
16. SUPPLEMENTARY NOTATION				
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP		
			Pre-College, Engineering Enrichment, Academic Summer Program	
			(EG)	
19. ABSTRACT (Continue on reverse if necessary and identify by block number)				
<p>PREFACE, a two-week residential program for disadvantaged students, women and members of ethnic minority groups historically underrepresented in scientific, technological and engineering professions, will celebrate its thirteenth summer program in 1990. PREFACE is designed to facilitate a broader and deeper understanding of engineering and related professional career options, and the kinds of competencies and expectations of engineering faculty and professionals on the collegiate and practitioner levels. The most unique feature of PREFACE is its linking the development of engineering professionals (theoretical) and the practice and application of engineering and scientific principles (practical). Participants have the opportunity to learn what engineering is from experts in the various fields of engineering and observe how principles of engineering are applied in industrial and research settings. This summer experience serves to clarify the kinds of knowledge and skills essential to successfully complete an engineering degree.</p> <p style="text-align: center;">(OVER)</p>				
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION	
22a. NAME OF RESPONSIBLE INDIVIDUAL Mark D. Smith, Asst. Dean of Students, OMSA			22b. TELEPHONE (Include Area Code) (518) 276-6272	22c. OFFICE SYMBOL

90 01 12 032

19. ABSTRACT (Continued)

Participants are selected from a nation-wide pool of applicants and spend two weeks on the Rensselaer campus attending lectures, demonstrations, visiting research and industrial facilities, learning interactive computer graphics design applied to engineering problems, and interacting with faculty, engineering professionals and Rensselaer undergraduate students. These experiences provide a valuable base from which to plan appropriate academic course-work during their senior year in high school, clarify what engineering is and how it is applied to solving problems, and realize that engineering and related professional careers are accessible.

The Office of Naval Research supports 15 disadvantaged participants as "ONR Scholars" for the two-week program.

FINAL TECHNICAL REPORT

**Office of Naval Research
Agreement No. N00014-89-J-1857
RPI Project No. 6-28442**

The PREFACE Program is a two-week residential summer program designed to provide an introduction to engineering experience for members of ethnic minority groups, women and disadvantaged students historically underrepresented in the engineering professions. There were thirty-nine participants in the 1989 PREFACE Program; fifteen of which were designated ONR Scholars (Appendix I, Enrollment Profile). There were approximately 362 applicants in this year's applicant pool, the highest number of applicants in the history of PREFACE. Based on this increase in applicant pool, Rensselaer admitted nine additional students to the 1989 PREFACE Program. This represents an 11 student increase from 1988 (28 participants). Of the 39 participants, fifteen (15) were Black, eight (8) Hispanic, twelve (12) Caucasian, three (3) Asian-American and one (1) Native American. There were twenty-nine (74%) female and ten (26%) males, which is consistent with previous years. There were sixteen states represented by the participants. The largest number of participants were from New York (9), followed by Texas (4) and Puerto Rico (4), Connecticut and Oregon each with three participants, Pennsylvania, Maine, Georgia, Michigan, and Missouri each with two participants, and Massachusetts, Maryland, Wisconsin, Vermont, Illinois and Ohio each with one participant. It is gratifying to note that we are able to generate considerable interest in PREFACE on a national scale.

The principal goal of the PREFACE Program was to facilitate a broader and deeper understanding of engineering professions, career options, and the kinds of competencies and expectations of engineering faculty and professionals on the collegiate and practitioner levels. To this end, participants were exposed to a range of activities, lectures and discussions relevant to developing appropriate connections between the sciences, mathematics, engineering and practical applications of knowledge to solving real-world problems (APPENDIX II, PREFACE Program Schedule). The intention and focus of the collective experience was to demonstrate by example and description the diversity of

scientific and engineering professions, the linkage between academic and practical application of knowledge, and the importance of developing style of problem solving consistent with and appropriate for the solution of novel and undefined problems. Participants had a unique opportunity to clarify their own goals and interests by exploring with experts in their respective fields the kinds of knowledge and problem solving skills critical to successfully meeting the demands and expectations of a rigorous engineering curriculum.

Participants in the 1989 PREFACE Program were able to demonstrate a strong motivation toward developing the kinds of skills and knowledge appropriate for pursuing careers in engineering, the sciences and technological professions. Each participant, on their evaluation of PREFACE, indicated an increased resolve and confidence in their ability to acquire and apply knowledge toward engineering and related professions. The success of PREFACE is based on the capability of the faculty and staff at Rensselaer to provide appropriate academic and support services to participants in the summer experience. This capability continues to be demonstrated as participants successfully complete the program. We look forward to the continued success of the PREFACE Program in the years to come.

SUMMARY OF RESULTS FROM THE PREFACE PROGRAM SURVEY

During the 1987-88 funding year, a survey of past PREFACE Program participants (1978, 1980-84, 1986) was conducted to assess the impact of the PREFACE experience on future endeavors of program participants. Based on a return of seventy-two surveys (60% response rate), 62 (86%) have majored or intend to major in engineering or the sciences/mathematics, 4 in management, and 6 in other non-technical areas (e.g., law, education, etc.). Of the 72 survey respondents, 24 (33%) were male and 48 (67%) female. The ethnic breakdown of respondents was 31 (43%) Black, 18 (25%) Caucasian, 15 (21%) Hispanic, 5 (7%) Asian-American and 3 (4%) Native American. All respondents have attended, are attending or plan to attend four-year postsecondary institutions (APPENDIX III, List of Postsecondary Institutions). It should also be noted that seven respondents are pursuing or completed their Master's in engineering and two have completed their Ph.D. in

engineering. All 72 respondents commented on their continuing correspondence with other PREFACE participants. Overall, the survey responses demonstrate the success the program has had improving access to the engineering, scientific and technological professions for disadvantaged and members of minority groups historically underrepresented in these professions.

Typical comments in response to "the most important aspects of the program you attended and why these are most memorable" highlight the impact and importance of PREFACE in the development of each participant. I include some selected comments here that represent those commonly referred to by the respondents:

The lectures concerning the different types of engineering was the most important aspect to me. They are most memorable because they allowed me to clarify my career goals. (*Senior, St. Ignatius High School, Cleveland, OH, 1986*)

I was able to talk to professors and discover what field of engineering suited me most. (*Senior, Berne-Knox-Westerloo High School, Berne, NY, 1986*)

We went indepth into all types of engineering and it helped answer alot of questions. My decision on what I wanted to do with the rest of my life was facilitated with the guidance and information I received as a participant in PREFACE. Another aspect with perhaps equal importance is the fact that I met so many people and made new friends. It was nice for once to not be the minority, but the majority. (*Freshman, Rensselaer Polytechnic Institute, Troy, NY, 1986*)

The problems assigned were thought-provoking. The different tours exposed students to sites they would not usually see. It was interesting to view the many engineering processes applied during the tours. (*Sophomore, Brown University, Providence, R.I., 1984*)

The field trips were the most memorable because they helped me understand what an engineer did. Before the program, I didn't really know about the different types of engineering or what they did as professional engineers. (*Sophomore, Cornell University, Ithaca, NY, 1984*)

It (PREFACE) influenced me particularly in choosing a college major (I had never heard of materials science, my current major, before). The counselors were important role models, as were the other student in the program. I made some lasting friendships. (*Senior, University of California-Berkeley, 1982*)

I found out there were other people like me, and everyone involved (faculty, counselors and students) made me feel comfortable with what I wanted to become. (*Graduate, Rensselaer Polytechnic Institute, BSE - Chemical Engineering, 1981*)

At PREFACE, I was exposed to a good picture of the engineering profession. It made me ask questions over the next year at high school, so that by the time I entered college, I was sure that I wanted to be an engineering major.
(Graduate Student, University of California-Berkeley, pursuing MS in Materials Science Engineering, 1980)

Of the many postscripts added to the survey by several participants, this one seems to sum up the feelings and importance of PREFACE. There is little more that can be said to demonstrate the impact of PREFACE on those fortunate enough to have participated.

I would like to give back something to the PREFACE Program, but I have no idea how I could aid in furthering such a good cause. I feel that RPI is a major factor in my being where I am today, and I would like to show my appreciation by doing something. *(Junior, Stanford University, 1983)*

This survey demonstrates the success of PREFACE. Every respondent stated that participation in PREFACE enabled them to attain a higher level of achievement, increased perseverance, and improved self-confidence to pursue their dream of a career in the engineering, scientific or technological professions. In comments regarding the project activities, all felt that having lecture/demonstrations, tours of research facilities, and visits to practicing engineers in industrial settings, significantly clarified and enhanced their understanding of scientific, technological and engineering careers in a way that could not have occurred without participation in PREFACE. Each respondent declared that, had he/she to do it all over again, he/she would attend PREFACE. The comments and rate of response are gratifying and demonstrate the success of the Program.

SUMMARY OF EXPENDITURES

ONR SUMMER SCHOLARS FOR 1989 PREFACE PROGRAM

Agreement No. N00014-88-J-1074

RPI Project No. 6-28427

	<u>ONR</u> <u>FUNDS(15)</u>	<u>RPI</u> <u>CONTRIBUTION(24)</u>	<u>TOTAL(39)</u>
PROFESSIONAL PERSONNEL			
Project Director (M. Smith)	n/c	n/c	n/c
Dorm Director (M. Facey)		\$ 1,200.00	\$ 1,200.00
Tutor Counselors (5 @ \$800.00 each)	\$ 800.00	3,200.00	4,000.00
Computer Course Instructor (L. Makinson)	1,500.00		1,500.00
Computer Graphics Instructor (J. Kolb)	<u> </u>	<u>1,000.00</u>	<u>1,000.00</u>
TOTAL, PROFESSIONAL PERSONNEL	\$ 2,300.00	\$ 5,400.00	\$ 7,700.00
FRINGE BENEFITS (21.4%)	n/a	n/a	n/a
OTHER DIRECT COSTS			
Honorarium and Travel for Guest Lecturers (P. Mercier, A. Orfitelli)	\$ 543.00		\$ 543.00
Participant Support Costs -			
Room: \$80/wk x 39 students x 2 wks.	2,400.00	\$ 3,840.00	6,240.00
Board: \$110.88/wk x 39 students x 2 wks.	3,326.00	5,323.00	8,649.00
Travel: \$307.79/student x 39 students	4,617.00	7,387.00	12,004.00
Books & Supplies: \$41.37 x 39 students	621.00	993.00	1,614.00
Computer Usage: \$79.53/stud. x 39 students	1,193.00	1,909.00	3,102.00
Health Fee: \$10.71/student x 39 students			
Staff Support Costs -			
Room: \$78/wk x 3 wks. x 5 Staff		\$ 1,170.00	1,170.00
Board: \$82/wk x 3 wks x 5 Staff		1,230.00	1,230.00
Postage, Telephone & Duplication Costs	<u> </u>	<u>679.00</u>	<u>679.00</u>
TOTAL, OTHER DIRECT COSTS	\$12,700.00	\$22,531.00	\$35,231.00
INDIRECT COSTS	n/a	n/a	n/a
TOTAL PROJECT COSTS	\$15,000.00	\$27,931.00	\$42,931.00

PREFACE PROGRAM COST PER STUDENT: \$1,101.00

TOTAL, PROJECT COSTS: \$42,931.00

APPENDIX I

1989 PREFACE PROGRAM

OFFICE OF NAVAL RESEARCH SCHOLAR ROSTER

NAME	STATE	SEX	ETHNICITY
Blankenship, Marne	MA	F	B
Clonmell, Milton	CT	M	M
Collison, Theresa	PA	F	B
Gerales, Lea	MD	F	AA
Gonzalez, Jennifer	TX	F	H
Guillemette, Michelle	ME	F	C
Jacob, Torkonya	GA	F	B
LaMori, Michelle	NY	F	C
McKenzie, Dane	NY	M	B
Pool, Sheina	OR	F	B
Priest, Christina	TX	F	NA
Rivera, Jamar	NY	M	H
Soffin, Rachel	NY	F	B
Sowell, Quinton	OH	M	B
Stone, Stephanie	NY	F	B

NOTE: (B) African American; (H) Hispanic; (C) Caucasian; (AA) Asian American;
(NA) Native American/Alaskan Native

APPENDIX II
PREFACE Program Schedule
July, 1989

MONDAY, JULY 17

8:30 - 9:00
CII 3051

Orientation
Dr. Paul Derusso, Associate Dean, School of Engineering
Mr. Norman Burnett, Associate Dean of Students and
Director of the Office of Minority Student Affairs

9:00 - 10:00
CII 3051

Computer Lecture
Lew Makinson, Engineering Computing Services
R. Lindsay Todd, Engineering Computing Services

10:00 - 11:00
CII 3112

Session on Computer Terminals

11:00 - 12:00
CII 3045

Discussion: Civil Engineering
Mr. Robert Dunn, Civil Engineering

12:00 - 1:00
COMMONS Dining Hall

Lunch

1:00 - 2:00
CII 3045

Computer Graphics Lecture
Lew Makinson, Engineering Computing Services
R. Lindsay Todd, Engineering Computing Services

2:00 - 3:15
CII 3112

Session on Computer Graphics Terminals

3:30 - 4:30
CC 308

PHYSICS Magic Show
Annette Orfitelli, Department of Physics

5:00 - 6:00
COMMONS Dining Hall

Dinner

6:00 - 8:00
CII 3112

Session on Computer Terminals

9:00 - 10:00
Davison Hall

Group Meeting

TUESDAY, JULY 18

8:30 - 9:00
CII 3051

Group Meeting

**9:00 - 10:00
CII 3051**

Computer Lecture
Lew Makinson, Engineering Computing Services
R. Lindsay Todd, Engineering Computing Services

**10:00 - 12:00
CII 3112**

Session on Computer Terminals

**12:00 - 1:00
COMMONS Dining Hall**

Lunch

1:00 - 2:30

Tour of LINAC Center
Dr. Robert Block, Nuclear Engineering

**2:45 - 4:00
CII 3045**

Professional School Orientation:
Dean David Haviland, School of Architecture
Dr. Michael Halloran, Associate Dean, School of Humanities &
Social Sciences
Dr. Barry Taylor, Director of Student Programs, School of
Management

**4:00 - 5:00
CII 3112**

Computer Lecture & Session on Computer Terminals
Lew Makinson, Engineering Computing Services
R. Lindsay Todd, Engineering Computing Services

**7:00 - 8:30
Davison Hall**

Admission and Financial Aid
Ms. Deborah Richardson, Associate Dean of Admissions and
Financial Aid
Ms. Lydia Broome, Assistant Dean of Students/Assistant Director,
Higher Education Opportunity Program
Ms. Ginny Crotty, Associate Director of Financial Aid

**8:30 - 9:30
Davison Hall**

Ice Cream Social

WEDNESDAY, JULY 19

**8:30 - 9:00
CII 3051**

Group Meeting

**9:00 - 10:00
CII 3051**

Computer Lecture
Lew Makinson, Engineering Computing Services
R. Lindsay Todd, Engineering Computing Services

**10:00 - 11:00
CII 3112**

Session on Computer Terminals

**11:00 - 12:00
CII 3045**

Discussion: Electrical and Computer Systems Engineering
Dr. Bruce Carlson, Electrical, Computer, & Systems Engineering

**12:00 - 1:00
COMMONS Dining Hall**

Lunch

**1:00 - 2:00
CC 308**

**Chemistry Lecture / Demonstration
Dr. Robert Reeves, Chemistry Department**

**2:00 - 3:00
MRC 148A**

**Tour of Materials Engineering Laboratory
Dr. Roger Wright, Professor of Materials Engineering**

**3:00 - 4:00
CII 3045**

**Computer Lecture
Lew Makinson, Engineering Computing Services
R. Lindsay Todd, Educational Computing Services**

**4:00 - 5:00
CII 3112**

Session on Computer Terminals

**7:00 - 8:30
CC 324**

**Meet the Administration
Dr. Hal Richtol, Dean of Undergraduate Education
Dr. Lee Wilcox, Vice President for Student Affairs
Dean Eddie Knowles, Dean of Students**

**9:30 - 10:00
Davison Hall**

Group Meeting

**10:00
Davison Hall**

Pizza Party

THURSDAY, JULY 20

**8:30 - 9:00
CII 3051**

Group Meeting

**9:00 - 10:00
CII 3051**

**Computer Lecture
Lew Makinson, Engineering Computing Services
R. Lindsay Todd, Engineering Computing Services**

**10:00 - 11:00
CII 3112**

Session on Computer Terminals

**11:00 - 12:00
CII 3045**

**Problem Solving: Thinking To Learn
Mark Smith, Assistant Dean of Students/Director of
Academic Support Programs**

**12:00 - 1:00
COMMONS Dining Hall**

Lunch

1:00

**Departure for NASA-Lewis Research Center, Cleveland,
Ohio**

FRIDAY, JULY 21

NASA-Lewis Research Center

SATURDAY, JULY 22

Return to RPI from NASA-Lewis Research Center

SUNDAY, JULY 23

MONDAY, JULY 24

**8:30 - 9:00
CII 3051**

Group Meeting

**9:00 - 10:00
CII 3051**

Computer Graphics Lecture
Lew Makinson, Engineering Computing Services
R. Lindsay Todd, Engineering Computing Services

**10:00 - 11:00
CII 3112**

Session on Computer Graphics

**11:00 - 12:00
CII 3045**

Discussion: Mechanical Engineering
Dr. Richard Smith, Associate Professor of Mechanical Engineering

**12:00 - 1:00
COMMONS Dining Hall**

Lunch

**1:00 - 2:00
CII 3045**

Discussion - Biomedical Engineering
Dr. Jonathan Newell, Professor of Biomedical Engineering

**2:00 - 3:00
CII 3045**

Computer Graphics Lecture
Lew Makinson, Engineering Computing Services
R. Lindsay Todd, Engineering Computing Services

**3:00 - 5:00
CII 3112**

Session on Computer Graphics

**6:00 - 8:00
CII 3112**

Session on Computer Graphics

**8:30 - 9:30
Davison Hall Lounge**

Graduate Student Forum:
Mr. Vroman Wright, Graduate Student Coordinator,
Collegiate Science and Technology Entry Program,
Office of Minority Student Affairs

TUESDAY, JULY 25

**8:30 - 9:00
CII 3051**

Group Meeting

9:00 - 10:00
CII 3051

Computer Graphics Lecture
Lew Makinson, Engineering Computing Services
R. Lindsay Todd, Engineering Computing Services

10:00 - 12:00
CII 3112

Session on Computer Graphics

12:00 - 1:00
COMMONS Dining Hall

Lunch

1:00 - 2:00
CII 3045

Tour of Mechanical Engineering Laboratory
Dr. Richard Smith, Associate Professor of Mechanical Engineering

2:15 - 4:30

WEDNESDAY, JULY 26

8:30 - 9:00
CII 3051

Group Meeting

9:00 - 10:00
CII 3051

Computer Graphics Lecture
Lew Makinson, Engineering Computing Services
R. Lindsay Todd, Engineering Computing Services

10:00 - 12:00
CII 3112

Session on Computer Graphics

12:00 - 1:00
COMMONS Dining Hall

Lunch

1:00 - 2:00
CII 3045

Discussion: Industrial and Management
Engineering
Dr. Gene Simons, Professor of Industrial and Management
Engineering

2:00 - 3:00
CII 3045

Tour: Center for Industrial Innovation and Center for
Integrated Electronics
Dr. Christopher LeMaistre

4:00 - 6:00
Davison Hall

Steak Bar-B-Q: Faculty, Students, Guests and Staff

THURSDAY, JULY 27

8:30 - 9:00
CII 3051

Group Meeting

9:00 - 11:10

CHEMISTRY COMPETITION

Mr. Paul Mercier, General Chemistry Laboratory Coordinator
Mark Smith, Assistant Dean of Students/Director of
Academic Support Programs

11:15 - 12:15
CII 3112

Session on Computer Graphics

12:15 - 1:00
COMMONS Dining Hall

Lunch

1:00 - 2:00

2:00 - 5:00

General Electric: Research and Development Center
Dr. Frank Starkey, Manager, General Electric Company

FRIDAY, JULY 28

8:30 - 9:00
CII 3051

Group Meeting

9:00 - 12:00
CII 3112

Session on Computer Graphics

12:00 - 1:00
COMMONS Dining Hall

Lunch

1:00 - 2:30

Session on Computer Graphics

3:00 - 4:00
CII 3045

Center for Manufacturing Productivity & Advanced
Technology: Computer Simulation

6:30 - 9:00
SAGE Dining Hall

FAREWELL BANQUET & GRADUATION

SATURDAY, JULY 29

DEPARTURE FOR HOME !!!!

APPENDIX III

LIST OF POSTSECONDARY INSTITUTIONS ATTENDED BY PREFACE PROGRAM PARTICIPANTS (1987-89 PREFACE PROGRAM PARTICIPANT SURVEY)

Cooper Union
Columbia University
Georgia Institute of Technology
George Washington University
University of Michigan
Carnegie Mellon University
Rensselaer Polytechnic Institute
Carleton College
Harvard University
Stanford University
Texas A & M University
Massachusetts Institute of Technology
University of California - Berkeley
Johns Hopkins University
SUNY-Buffalo
Virginia Tech
Rice University
University of Virginia
University of Missouri - Kansas City Medical School
Florida State University
University of Alabama
Princeton University
Iowa State University
University of Southern California
Duke University
Northwestern University